

Amendments to the Specification

Please replace paragraph [0065] with the following amended paragraph:

[0065] In the present invention a consumable cathode with a working surface being evaporated under the action of a vacuum-arc cathode spot, and thus emitting a cathode material plasma flow, is combined with a tubular anode arranged opposite the working surface of the cathode and with magnetic coils embracing the cathode and anode to form a plasma generator. This generator is further combined with a plasma filter that has rectilinear tubular plasma ducts forming a curvilinear plasma-guiding channel and having at least one outlet port. The plasma filter excludes direct ~~lines~~line of-sight paths between the outlet port and the cathode of the plasma generator. The vacuum arc and the magnetic coils are energized by independent power sources. The plasma-guiding channel serves to transport plasma from the plasma generator to the filter outlet port and to a substrate work piece arranged opposite the port opening, and also to absorb the emitted macroparticles of the cathode material. The plasma filter also includes magnetic coils embracing the plasma ducts and serving to generate a composite magnetic field directing plasma ions and electrons along the plasma-guiding channel to the work piece substrate.

Please replace paragraph [0074] with the following amended paragraph:

[0074] A further arrangement of the present invention filtered cathodic-arc plasma source differs from the arrangements disclosed thus far in that the plasma filter used comprises an additional plasma duct joined to the input plasma duct opposite to the output plasma duct and coaxially with the output plasma duct. In this case, the segments of the first correcting magnetic coil and the second correcting magnetic coil on the side of the additional plasma duct, i.e., the second output plasma duct, are bent back to opposite duct-orthogonal directions so that each of them bends around the additional plasma duct along its perimeter. The additional plasma duct is also provided with an output duct entrance magnetic coil, which is connected to a power source in such a way, that the magnetic field generated by it is directed opposite to the field generated by the output magnetic coil. In this arrangement there exists the possibility of forming two output filtered-plasma flows directed to opposite directions. To provide the possibility of forming a filtered cathodic-arc plasma flow of complex (e.g., two-component) composition, ~~the~~an additional filtered plasma source in one of the above considered arrangements may be joined to the ~~said~~ additional plasma duct.

Please replace paragraph [0076] with the following amended paragraph:

[0076] With the preceding general word descriptions of the several arrangements of the invention in mind it is believed now possible to appreciate the following more detailed descriptions of the invention. Accordingly, the filtered cathodic-arc plasma source shown in the drawing of FIG. 1 comprises a plasma generator 1 and a plasma filter 2. The plasma generator 1 comprises a cylindrical consumable cathode 3 with an evaporable end surface 3' (later called a "working surface"), a tubular anode 4, placed opposite the working surface 3' of the cathode 3, and also a cathode magnetic coil 5 and an anode magnetic coil 6. The cathode magnetic coil 5 and anode magnetic coil 6 attend or embrace respectively the cathode 3 and the anode 4. An input plasma duct 8 matched with an output plasma duct 9 is connected to the output end 7 of the tubular anode 4 via an insulator 32 and insulated threaded members 33.

Please replace paragraph [0078] with the following amended paragraph:

[0078] The portions of the first correcting magnetic coil 17 and second correcting magnetic coil 18 disposed along the side of the output plasma duct 9 are bent back into opposing flares 17' and 18' generally disposed orthogonal to the output plasma duct 9. Flares 17' and 18' may be said to additionally provide the magnetic coils 17 and 18 with the saddle-like configuration in view of the resulting compound curvature shape of the magnetic coils, a shape perhaps best appreciated in the FIG. 2 drawing. The input-opposite end of the input plasma duct 8 is closed by a cover 19 in which there is received an electrode 20 that is electrically insulated from the plasma duct 8 and preferably connected to a source of bias supply voltage 37. The source 37 may be operated at a typical potential in the range of 5 to 40 volts. The exit end or port 13 of the output plasma duct is connected to the vacuum chamber 39 housing the work piece or substrate 34 being treated. The dimensions (lengths and diameters) of the anode 4 and the plasma ducts 8 and 9 are chosen so as to exclude the direct line-of-sight between the working surface 3' of the cathode 3 and the exit opening 13 of the plasma-guiding channel. The plasma ducts 8 and 9 are vacuum-tightly connected with the anode 4 and the vacuum chamber 39, respectively, through insulators that are not shown in the FIG. 1 drawing. The internal walls of plasma ducts 8 and 9 carry transverse plates or fins 21 intended to suppress the rebound of macroparticles from the plasma duct walls. The plasma filter 2 can be provided, if necessary, with an optional

plasma duct lengthening section 9a and an attending supplemental magnetic coil 16a. The lengthening section 9a is useful when the output of the filter is to be delivered over unusually long distances to the vacuum chamber 39 and substrate 34 or within the vacuum chamber 39. An exit end or port for the lengthening section 9a is indicated at 13'; this identification is similar to that of the exit end or port 13 of the output planar duct discussed above herein.

Please replace paragraph [0105] with the following amended paragraph:

[0105] A further arrangement of the FIG. 9a filtered cathodic-arc plasma source with an additional plasma duct is schematically illustrated in FIG. 9c. Here, the end of the additional plasma duct 29 is connected with a second filtered cathodic-arc plasma source 1a of the FIG. 1 type. The FIG. 9c source also provides a flow of filtered two-component plasma. Unlike the above-considered Figs. 8 and 9b two component sources however, the FIG. 9c plasma source precludes the possibility of transporting material from one cathode onto the other cathode in the form of macroparticles--because between the cathodes 3 and 3' of generators 1 and 1', respectively, there is no direct line-of-sight. This feature of the FIG. 9c plasma source permits its use as a source of both gas and metal plasmas for example for performing the so-called duplex treatment of materials. In such duplex treatment a treating of the article or work piece by gas plasma (i.e., ion etching, nitriding, plasma-immersion ion implantation, etc.) is combined with deposition of a coating through condensation from a metal plasma. The gas plasma is generated by an arc discharge burning in one of the plasma generators, e.g., in the generator 1' in FIG. 9c at a working gas pressure of about 10^{-1} Pa and higher, with the auxiliary anode in the vacuum chamber (not shown in the drawing) and with the magnetic coils of the filter 2' deactivated.

Please replace paragraphs [0113] and [0114] with the following amended paragraphs:

[0113] A test model of the present invention filtered cathodic-arc plasma source according to the arrangement shown in FIG. 5 may be considered as exemplary. In this source the cathode 3 of plasma generator 1 may be a cylinder, 60 millimeters in diameter of Titanium cathode material. The non-working end of the cathode, the anode and the plasma ducts are preferably cooled with water. The anode and all plasma ducts may be made from a nonmagnetic stainless steel. The inner diameter of anode 4 and plasma ducts 8 and 9 may be 190 millimeters. The anode length may be 200 millimeters and the length of each

of plasma-guiding channel element 11, 12, 9, & 9a made 190 millimeters. The number of Ampere-turns in the magnetic coils of the system may be such as provide the magnetic field distribution shown in FIG. 6 at a field intensity of 50 Oersteds on the axis of the output plasma duct 9. Typical Ampere-turns characteristics for the magnetic coils 5, 6, 14, 15, 16, 16a, 17, 18 and 24 are 2000, 1000, 800, 800, 700, 700, 500, 500 and 800 respectively.

[0114] The influence of currents in the output duct entrance magnetic coil (I_{24}) and correcting magnetic coils ($I_{17, 18}$) on the output ion current value of the source, as well as the influence of bias voltage across the plasma ducts on the output ion current is shown in FIGs. 12 through 14 of the drawings. The ion currents represented in these drawings may be measured with a collector electrode using an arc current of 110 Amperes. The magnetic coil currents shown in FIG. 12 and FIG. 13 may be assumed to flow in windings having 150 turns of wire. The input ion current, as may be measured with a collector electrode at the entrance of filter 2, is about 8 Amperes. Hence the ion transmission efficiency defined as the ratio of output ion current to input ion current reaches 67% in the FIG. 10 instance. From the data presented it may be observed that the described filtered cathodic-arc plasma source more than twice outperforms similar-purpose known devices in the efficiency of plasma ion component transported through the filter.